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USER GUIDE

DPT-R8

Produal

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PRODUAL

PART OF BEMSIQ GROUP

DPT-R8 differential pressure transmitter

USER GUIDE

Made in Finland

5 years warranty

MANAGEMENT SYSTEM CERTIFICATION DNV ISO 9001 • ISO 14001

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1 Introduction

The DPT-R8 differential pressure transmitters measure static and differential pressure. They provide eight pressure measurement ranges per model, and support six measurement units for the display.

The DPT-R8 transmitter has one voltage output and one current output. The voltage output is scalable (0...10 V / 2...10 V). The current output is not scalable.

The following options are available:

- Display (-D models)
- Automatic zeroing (-AZ models)
- Span point adjustment (-S models)
- Cold resistance up to -40 °C (-40C models)

The -D models have a display that shows the pressure measurement value and the measurement unit.

The -AZ models adjust the zero point automatically and do not require manual zeroing.

The -S models have a span point adjustment function for cleanroom applications and other high-accuracy applications that require annual calibration of differential pressure transmitters.

The -40C models are designed for very cold environments up to -40 °C. A heating element warms the transmitter in subzero temperatures.

You can commission the transmitter by selecting the measurement range, response time and output scaling with jumpers. You can also select the measurement unit for the display with a jumper in -D models.

1.1 About this user guide

This user guide contains important information about the installation, wiring, configuration and use of the product. Read this guide carefully before you install the product, connect the wires, or operate the product. Make sure that you fully understand all instructions before you start work. If you are not sure what the instructions mean, contact the seller or the manufacturer.

Follow all instructions in this user guide carefully. Always obey the applicable local rules and regulations.

The original instructions were written in English. If there are differences between the English instructions and the translations, refer to the English instructions.

If you find a mistake in the English instructions or in the translations, please send the details to the manufacturer.

1.2 Intended use

The DPT-R8 differential transmitters are intended to be used for measuring static pressure or differential pressure in commercial environments.

This device is compatible with dry air. It is intended to be connected to a building automation system in the HVAC/R industry.

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2 Safety precautions

The product is developed, manufactured and tested according to high quality standards. However, instructions for safe use must be followed when installing, using or disposing the product or parts of product.

Read this user guide carefully before you commission, use or service this device. To avoid any kind of damage to people or property, follow the instructions carefully. Produal is not liable for any hazards, injury to people, or damage to property caused by incorrect installation or misuse of the device.

To avoid electrical shock or damage to equipment, disconnect power before you install or service the product. Use only proper wiring that is rated for the full operating voltage and maximum current in the system. The wiring must also withstand fault conditions.

To avoid fire and/or explosion, do not use the product in potentially flammable or explosive atmosphere.

Make sure that the product is not damaged before installation. Do not drop the product or use excessive force during installation. Do not use the product if you can see any damages.

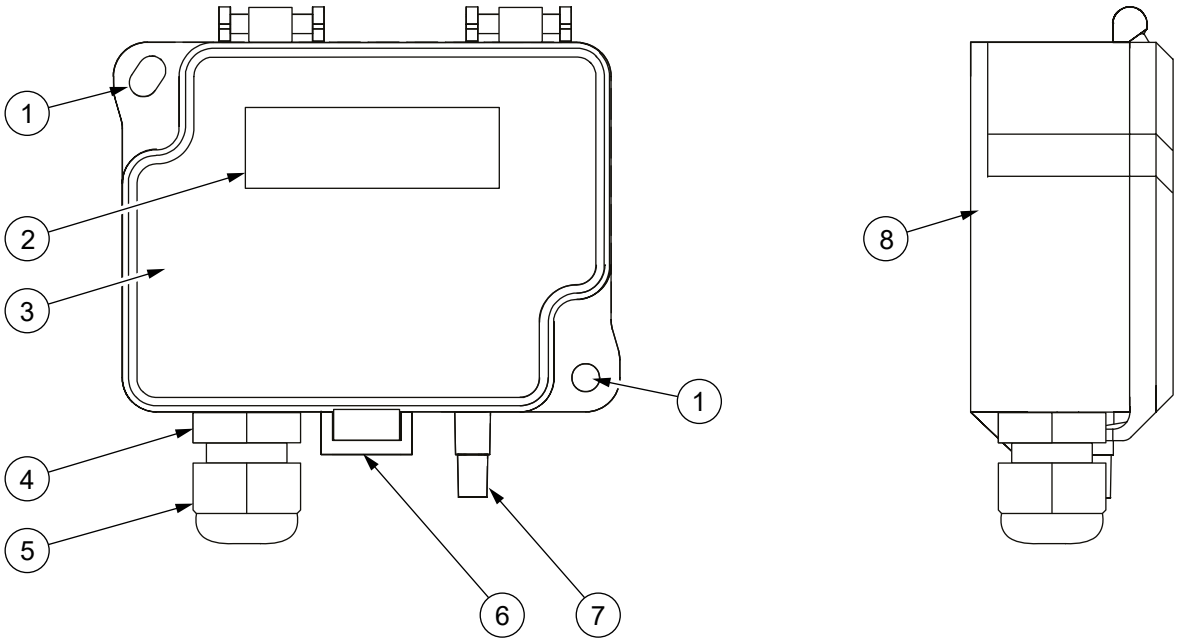
After installation, the product will be part of a system whose specifications and performance characteristics are not designed or controlled by Produal. Refer to national and local authorities to ensure that the installation is functional and safe.

The product should only be used in professionally designed applications. Unauthorised modifications are not allowed. The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or property.

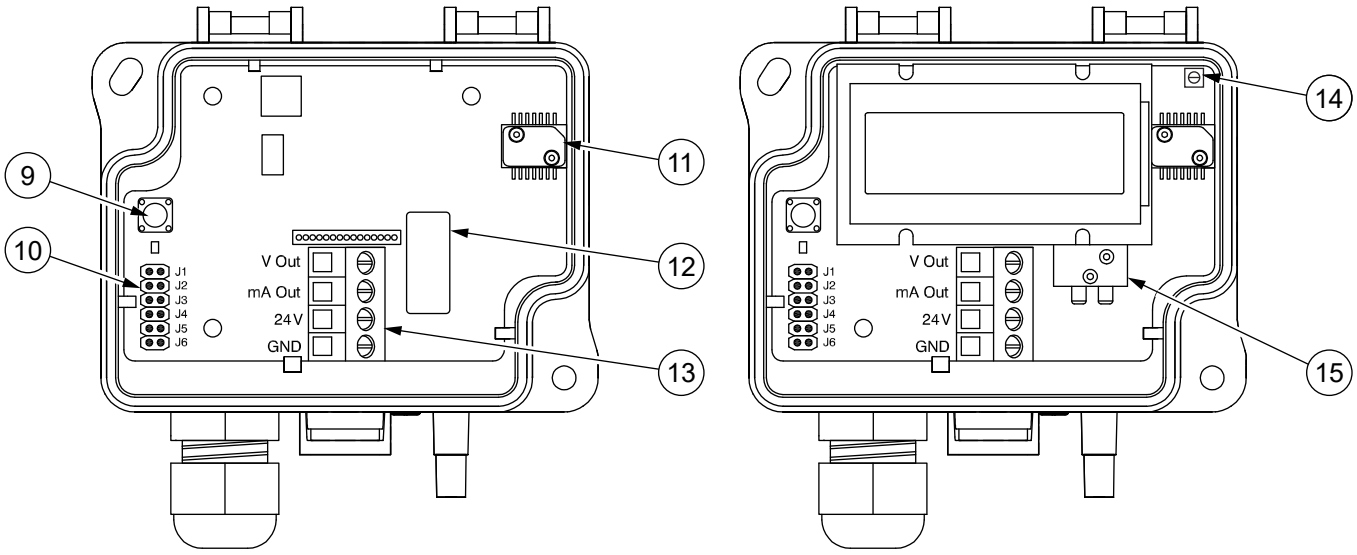
In this document, there are different warnings and notes. The warning and note types are defined in the following table.

Sign	Description
WARNING:	The warning symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION:	The caution symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
Important:	The important symbol indicates a potentially hazardous situation which, if not avoided, could result in damage to the device or property.
Note:	The note symbol indicates a useful tip or a recommended way to complete a task. These notes also provide information that is useful but not critical to the user.

3 Main components



1	Mounting point	2	Display (-D models)
3	Cover	4	Cable gland
5	Strain relief	6	Cover latch
7	Pressure connection (+ high pressure / - low pressure)	8	Housing



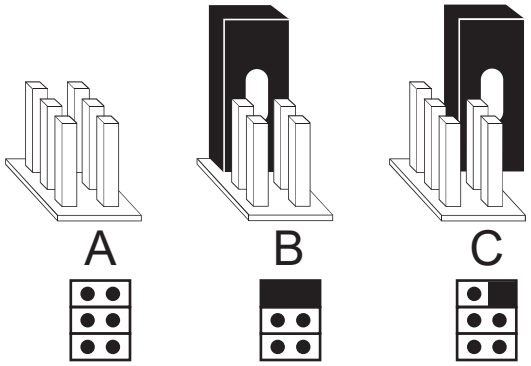
9	Zeroing button	10	Jumpers
11	Pressure sensor	12	Heating element (-40C models)
13	Terminal block	14	Span trimmer (-S models)
15	Automatic zeroing module (-AZ models)		

4 Commissioning

4.1 Setting the jumpers

Important: Set the jumpers in the correct position before you connect the supply voltage to the device.

Install the jumpers as shown in the figure below to close the circuit or to store the jumper while the circuit remains open.



A. No jumper: circuit open
B. Jumper installed: circuit closed
C. Jumper stored: circuit open

4.1.1 Selecting the measurement range

Note: Pascal (Pa) is the base unit for measurement. You can select some other unit to show on the display. The values for these other units are converted from pascals. The range tables below show the rounded values.

1. Find the device model in the product label of the device (for example, *DPT250-R8*).
2. Find the correct range table for your device model from the tables below.
3. Select the line with the correct pressure measurement unit from the range table.
   If your device does not have a display, select *Pa*.
4. Find the required measurement range from the selected line in the range table.

5. Look at the column header above the required measurement range to determine the range number.
For example, if the device model is *DPT250-R8*, the measurement unit is *Pa*, and the required measurement range is 0...250 Pa, the range number is 4.

DPT250-R8 ranges

Unit	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8
Pa	0...25	0...50	0...100	0...250	-25...25	-50...50	-100...100	-150...150
kPa	0...0.025	0...0.05	0...0.1	0...0.25	-0.025... 0.025	-0.0... 0.05	-0.1...0.1	-0.15... 0.15
mbar	0...0.25	0...0.5	0...1.0	0...2.5	-0.25... 0.25	-0.5...0.5	-1.0...1.0	-1.5...1.5
inchWC	0...0.1	0...0.2	0...0.4	0...1.0	-0.1...0.1	-0.2...0.2	-0.4...0.4	-0.6...0.6
mmWC	0...2.6	0...5.1	0...10.2	0...25.5	-2.6...2.6	-5.1...5.1	-10.2... 10.2	-15.3... 15.3
psi	0... 0.0036	0... 0.0073	0... 0.0145	0... 0.0363	-0.0036... 0.0036	-0.0073... 0.0073	-0.0145... 0.0145	-0.0218... 0.0218

DPT2500-R8 ranges

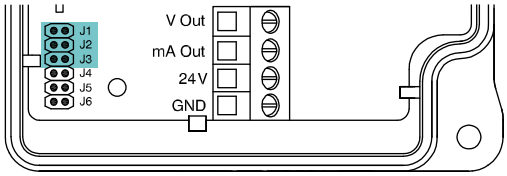
Unit	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8
Pa	-100...100	0...100	0...250	0...500	0...1000	0...1500	0...2000	0...2500
kPa	-0.1...0.1	0...0.1	0...0.25	0...0.5	0...1.0	0...1.5	0...2.0	0...2.5
mbar	-1.0...1.0	0...1.0	0...2.5	0...5.0	0...10.0	0...15.0	0...20.0	0...25.0
inchWC	-0.4...0.4	0...0.4	0...1.0	0...2.01	0...4.01	0...6.02	0...8.03	0...10.03
mmWC	-10.2... 10.2	0...10.2	0...25.5	0...51.0	0...102.0	0...153.0	0...203.9	0...254.9
psi	-0.0145... 0.0145	0... 0.0145	0... 0.0363	0... 0.0725	0...0.145	0...0.2176	0.... 0.2901	0... 0.3626

DPT7000-R8 ranges

Unit	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8
Pa	0...1000	0...1500	0...2000	0...2500	0...3000	0...4000	0...5000	0...7000
kPa	0...1.0	0...1.5	0...2.0	0...2.5	0...3.0	0...4.0	0...5.0	0...7.0
mbar	0...10.0	0...15.0	0...20.0	0...25.0	0...30.0	0...40.0	0...50.0	0...70.0
inchWC	0...4.01	0...6.02	0...8.03	0...10.03	0...12.04	0...16.05	0...20.07	0...28.09
mmWC	0...102.0	0...153.0	0...203.9	0...254.9	0...305.9	0...407.9	0...509.9	0...713.8
psi	0...0.145	0...0.2176	0... 0.2901	0... 0.3626	0...0.4351	0... 0.5802	0... 0.7252	0...1.0153

6. Find the range number in the jumper settings table below.

7. Install jumpers to *J1*, *J2* and *J3* jumper blocks as shown below the range number in the jumper settings table.



Jumper settings

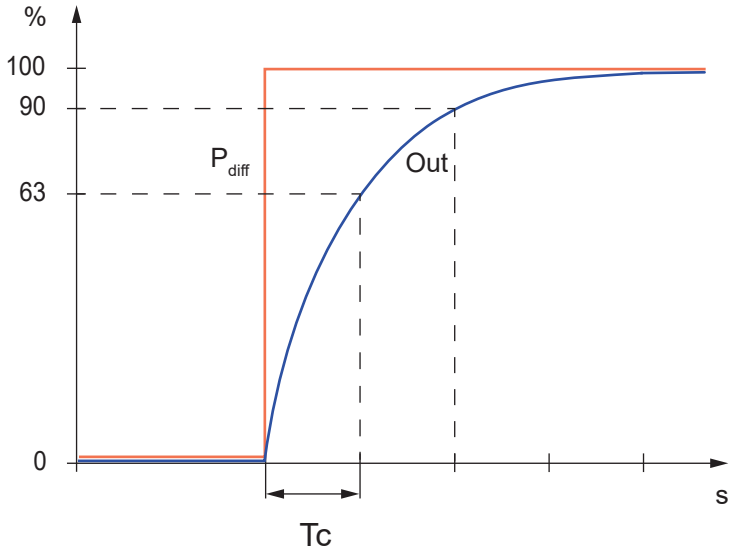
Install a jumper to jumper blocks that are fully black ■ in the table.

Jumper	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8
J1	● ●	● ●	● ●	● ●	■	■	■	■
J2	● ●	● ●	■	■	● ●	● ●	■	■
J3	● ●	■	● ●	■	● ●	■	● ●	■

4.1.2 Selecting the response time

The transmitter output signal starts to change immediately when the pressure difference increases or decreases. Response time is the time it takes for the transmitter output signal to reach 63 % of the final value after a change in differential pressure. This time period is also known as T_{63}.

Response time increases exponentially. The first 63 % of the final value equals to one time constant, but it takes four time constants before the output signal reaches 98 % of the final value. For example, if the response time is 8 seconds, the output signal reaches 98 % of the final value 32 seconds after differential pressure changes. Although the output signal can go very close to 100 % of the final value, it does not reach 100 % because of the laws of physics.



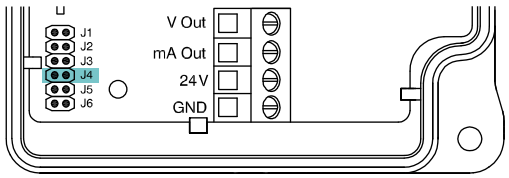
%	Final value
P_{diff}	Pressure difference
Out	Output signal
Tc	Time constant
s	Time (seconds)

You can set the transmitter response time to 0.8 seconds or 8 seconds. Select 0.8 seconds in applications where fast changes in pressure must be tracked accurately. Select 8 seconds in

applications where stability is more important than tracking fast changes. For example, you can use an 8-second response time to monitor filter cleanliness.

You can change the response time as follows:

- Install a jumper to the *J4* jumper block to select the 8.0 s response time.



- Remove the jumper from the *J4* jumper block to select the 0.8 s response time.

4.1.3 Selecting the output scaling

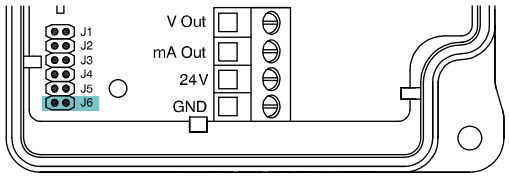
This transmitter has a voltage output and a current output for the pressure measurement signal. You can select one of these outputs during wiring according to system requirements.

The voltage output signal is scalable. You can select the output voltage range with a jumper. The available voltage ranges are 0...10 V and 2...10 V. The current output is not scalable.

If it is important to know immediately that a wire is broken or the device is damaged, select the 2...10 V output signal.

You can select the output range as follows:

- Install a jumper to the *J6* jumper block to select the 2...10 V output range.



- Remove the jumper from the *J6* jumper block to select the 0...10 V output range.

4.2 Mounting

WARNING: Handle the product with care. Dropping the product may cause internal damage and unwanted functions in the connected system.

CAUTION: Place the product outside the reach of children and animals.

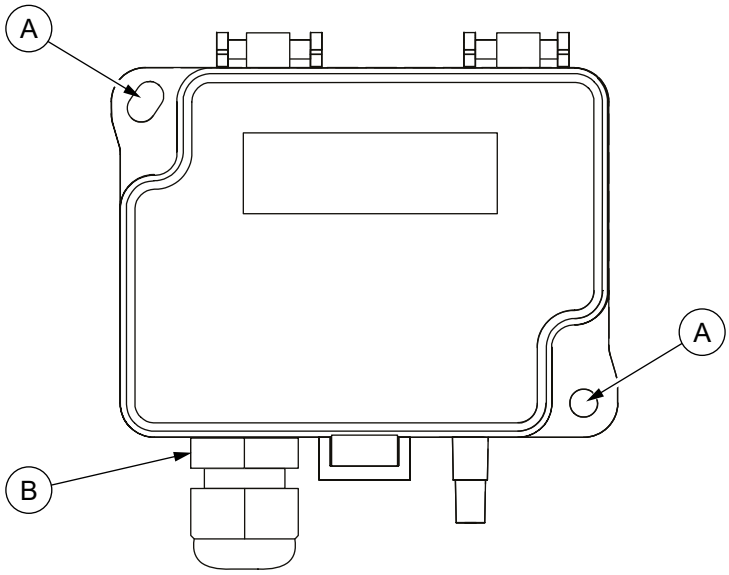
Important: The product may only be installed in a location where the ambient conditions meet the operating condition requirements.

Note: When the temperature drops below 0 °C, the display in -D models fades slightly and the response time increases.

Operating conditions

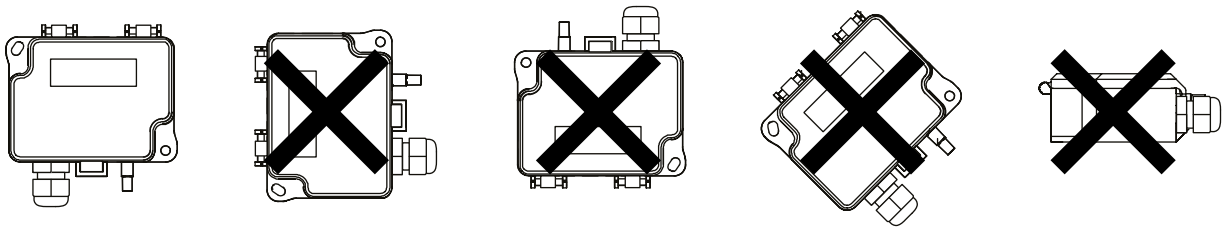
Ambient temperature	-20...50 °C
Ambient temperature (-AZ models)	-5...50 °C
Ambient temperature (-40C models)	-40...50 °C
Ambient humidity	0...95 %rH (non-condensing)

1. Check that the product is not damaged during transportation.
2. Select the mounting position on a wall or other flat and vertically upright surface.
3. Use the device as a template and mark the screw holes on the mounting surface.
4. Select the mounting screws according to the mounting surface.
   The maximum screw diameter is 4.0 mm.
5. Make sure that the cable gland points down.



A. Mounting point
B. Cable gland

6. Mount the device with the screws using the mounting points.
   See the figure below for the correct mounting orientation.

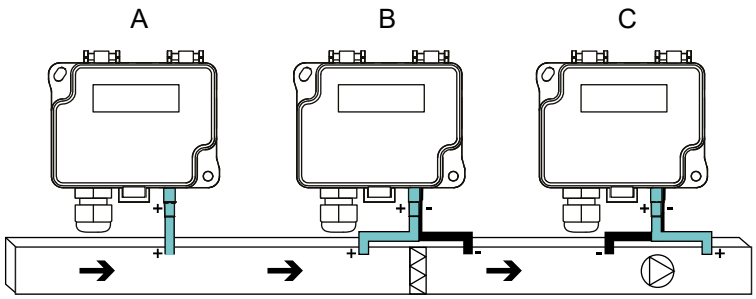


7. Make sure that the device is horizontally and vertically level.
8. Tighten the screws.

4.3 Connecting the pressure measurement hoses

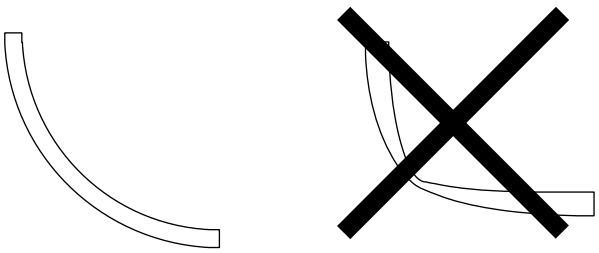
Note: The hose length does not have an effect on the measurement accuracy. However, long hoses cause delay to the measurement.

Connect the pressure measurement hoses to the pressure connections of the device according to your application:



A. Static pressure
B. Filter/damper monitoring
C. Fan/blower monitoring

- If the pressure is static, connect the pressure measurement hose to the "+" connection only.
- Filter or damper monitoring:
  1. Connect a pressure measurement hose to the duct on the high pressure side before the filter/damper and another pressure measurement hose on the low pressure side after the filter/damper.
  2. Connect the high pressure measurement hose to the "+" connection.
  3. Connect the low pressure measurement hose to the "–" connection.
- Fan or blower monitoring:
  1. Connect a pressure measurement hose to the duct on the low pressure side before the fan/blower and another pressure measurement hose on the high pressure side after the fan/blower.
  2. Connect the high pressure measurement hose to the "+" connection.
  3. Connect the low pressure measurement hose to the "–" connection.
- Install the measuring hoses carefully and make sure that the hoses do not bend too tightly. Too tight curves can prevent the air flow to the sensor.



4.4 Wiring

WARNING: Device wiring and commissioning can only be carried out by qualified professionals. Always make the device wirings in de-energised electricity network.

WARNING: This product is appliance class III product according to IEC 60664-1. The product may only be connected to SELV (separated extra low voltage) electricity network.

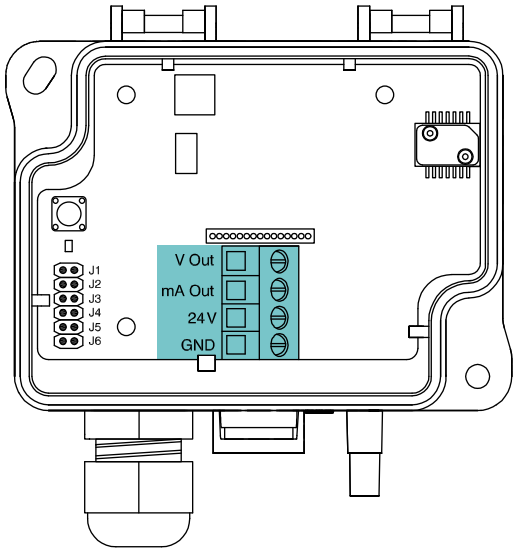
CAUTION: Use single stranded wires or use wire end sleeves if multi stranded wires are used.

Important: For CE and UKCA compliance, a properly grounded shielding cable is required.

1. Open the cover.
2. Unscrew the strain relief on the cable gland.

3. Route the cable through the strain relief and the cable gland.
4. Connect the wires to the terminal block according to the table below.

   Connect the signal wire to voltage output or current output according to system requirements.



V Out	Voltage output: 0...10 V / 2...10 V, load > 1 kΩ
mA Out	Current output: 4...20 mA, load 20...500 Ω
24 V	24 Vac/dc power supply
GND	0 V

The nominal tightening torque for wiring terminal screws is 0.4 Nm.

Important: Do not use excessive force when you tighten the wiring terminal screws.

5. Tighten the strain relief.

4.5 Selecting the measurement unit

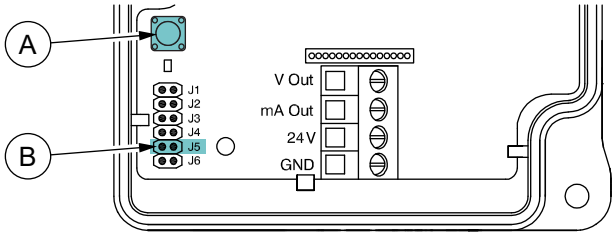
If the transmitter has a display (-D models), you can select the measurement unit shown on the display as follows:

1. Open the cover.
2. Make sure that the wires are correctly connected.
3. Switch the power on.

CAUTION: When the power supply is connected, be extra careful when handling the product without the cover.

4. Install a jumper to the *J5* jumper block to connect the two pins.

CAUTION: Do not touch the wires or the circuit board.



A. Zeroing button
B. *J5* jumper block

5. Push and hold down the zeroing button.
   The available measurement units are shown on the display one after the other.
6. When you see the correct measurement unit on the display, release the zeroing button.
7. Remove the jumper from the *J5* jumper block and attach it to only one pin to resume normal operation.
   The unit you selected is shown on the display.
8. Close the cover.
   The transmitter is now ready for use.

4.6 Operation in subzero temperatures (-40C models)

Note: When the operating temperature is below 0 °C, power consumption increases and the output signal has an additional measurement error of 0.015 V or 0.024 mA.

All -40C models have a heating element that warms the transmitter to keep it fully functional in very cold environments.

If you start the -40C model in subzero temperatures, keep the cover closed and let the display warm up for 15 minutes. The display operates correctly after the warm-up period.

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5 Maintenance

5.1 Automatic zeroing

The -AZ models include an automatic zeroing function, which adjusts the transmitter zero point every 10 minutes. Automatic zeroing removes output signal drift that can occur due to thermal, electronic or mechanical effects. As a result, it is not necessary to calibrate the transmitter zero point manually.

The zeroing takes approximately 5 seconds. During the zeroing process, the output and display values are locked to the latest measured value to avoid conflict with the building management system. A red indicator light comes on when zeroing starts. When the zeroing process is completed, the device returns to its normal measuring mode.

5.2 Manual zeroing

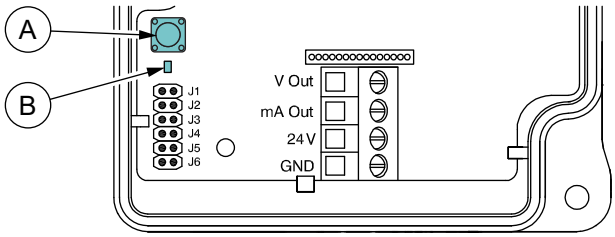
Note: If the device does not have automatic zeroing, the zero point will drift over time. Zero point drifting can cause problems depending on the application. In high-accuracy applications, use devices with automatic zeroing or reset the zero point manually every 6 months.

You can reset the zero point manually by using the zeroing button on the circuit board. Manual zeroing is not necessary for the -AZ models.

Note: Supply voltage must have been connected for one hour prior the zeroing.

1. Disconnect both pressure measurement hoses from the device.
2. Push the zeroing button until the red indicator light comes on.

   Text *Zeroing...* appears on the display in D-models.



A. Zeroing button
B. Indicator light

3. Wait for 5 seconds for the zeroing process to complete.
4. Connect the pressure measurement hoses to the device (+ high pressure, – low pressure).

   See section Connecting the pressure measurement hoses on page 10 for instructions.

5.3 Span point adjustment

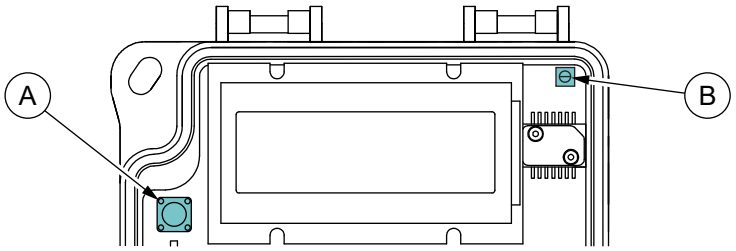
The -S models have a span point adjustment function. You can use the span point adjustment function to adjust the upper end of the measurement range. It is usually not necessary to adjust the span settings, because the manufacturer has already calibrated the span point. However, span point adjustment may be necessary for devices that are calibrated yearly.

You need a flat-head screwdriver and an accurate, certified pressure calibrator to supply reference pressure to the device during span point adjustment. If the transmitter does not have a display, you also need a multimeter.

Do the steps below to adjust the span point.

1. Connect pressure hoses between the pressure calibrator and the transmitter.
   a. Connect high pressure to the "+" connection of the transmitter.
   b. Connect low pressure to the "–" connection of the transmitter.
2. Supply reference pressure to the device.
   The reference pressure should be as close to the maximum value of the measurement range as possible. For example, if the transmitter measurement range is -50...50 Pa, set the pressure calibrator to supply a 50 Pa pressure.
3. Open the cover of the transmitter.
4. Push the zeroing button to reset the zero point manually.
   See section Manual zeroing on page 14 for instructions.
5. Turn the span trimmer with a flat-head screwdriver until the pressure value shown on the transmitter display is the same as the pressure supplied by the pressure calibrator.

   If the transmitter does not have a display, measure the pressure output signal using a multimeter.



A. Zeroing button
B. Span trimmer

6 Disposal

This device is considered as electrical and electronic equipment for disposal in terms of the applicable European Directive. At the end of life, the product must enter the recycling system at an appropriate collection point.

- The device must be disposed through channels provided for this purpose.
- The disposal must be completed according to the local and currently applicable laws and regulations.

Generally all metals can be recycled as material. Plastics and cardboard packaging material can be used in energy recovery. Printed circuit boards need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code. Contact your local Produal distributor for further information on environmental aspects and recycling instructions for professional recyclers.



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